

CHROMOSOME COUNTS FROM NEW MEXICO AND SOUTHERN COLORADO

Darrell E. Ward
Department of Biology
New Mexico State University
Las Cruces, New Mexico 88003 U.S.A.

The counts reported here are the result of general collecting in New Mexico and southern Colorado. Most agree with previously published counts, however, a few are unique and may provide clues suggesting intraspecific chromosomal variation, and the majority of them expand the cytogeographical knowledge of certain species into this area. Floral buds were collected into modified Carnoy's solution (4 chloroform: 3 absolute ethanol: 1 acetic acid) and then stained in Snow's (1963) hydrochloric acid-carmine stain. Voucher are deposited at NMC; dupes of some are at NY, TEX, MO, or UNM. The following codes for collectors are used in the listing: RJS = Robert Soreng, RWS = Richard Spellenberg, T = Thomas Todsen, and W = Darrell Ward.

ASTERACEAE *Acourtia nana* (A. Gray) Reveal & King. n=27. NM, Luna Co., N end of Sierra Rica Mtns., 2.5 air km ENE of right angle in U.S.-Mexican boundary. W & RWS 80-002.

Aster commutatus (Torr. & Gray) Gray var. commutatus. n=15. NM, McKinley Co., 3 km S of Fort Wingate, roadside of NM-400. RWS & W 6195.

Aster exilis Ell. n=5. NM, Grant Co., Faywood Hot Springs, N of intersection of NM-61 and US-180. RWS 6208.

Bahia absinthifolia Benth. var. dealbata (A. Gray) A. Gray. 2n=24II + 2B. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-065. All cells examined had two spherical supernumeraries which were smaller than the rest of the chromosomes present.

Bahia oppositifolia (Nutt.) DC. n=24. NM, Harding Co., 3 km W of Mills. RWS, RJS & W 6006.

Berlandiera lyrata Benth. var. lyrata. n=15. NM, Sierra Co., NM-52 roadside, 30 km NW of Cuchillo. W & T 81-167.

Bidens tenuisecta Gray. n=24. NM, Luna Co., roadside of NM-61, 5.5 km S of Faywood. RWS 6211.

Brickellia simplex Gray. n=9. NM, Hidalgo Co., Peloncillo Mtns., Skull Canyon. W & T 81-412.

Erigeron colo-mexicanus A. Nels. n=27. NM, Doña Ana Co., Organ Mtns., Dripping Springs Canyon, 17 km E of Las Cruces. W 81-076; and Harding Co., 16 km NNW of Mills. RWS et al. 6040. Pollen fertility of the specimen, as determined by cotton-blue staining, is very low (1% stained).

Erigeron divergens Torr. & A. Gray var. divergens. n=18. NM, Doña Ana Co., 0.8 km W of Organ, US-70 roadside. W & RWS 81-020.

- Gaillardia pulchella* Foug. var. *pulchella*. n=17. NM, Doña Ana Co., Organ Mtns., Aguirre Springs Recreation Area, 8 km SE of Organ. W & Arsuffi 81-096.
- Galinsoga parviflora* Cav. n=16. NM, Grant Co., Black Range, near NM-180, 9.5 air km SW of Emory Pass. W 80-022.
- Gutierrezia glutinosa* (Schauer) Sch. Bip. n=4. NM, Doña Ana Co., 13 km SE of Las Cruces. W & Price 81-108.
- Hymenothrix wislizenii* Gray. n=12. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6201.
- Hymenoxys acaulis* (Pursh) Park. var. *arizonica* (Greene) Park. n=15. NM, Harding Co., 16 km NW of Mills. RWS et al. 6037.
- Leucelene ericoides* (Torr.) Greene. n=16. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6086; and Grant Co., 11 km NW of Buckhorn, roadside of USFS-147. RJS & W 2140.
- Machaeranthera gracilis* (Nutt.) Shinners. n=2. NM, Hidalgo Co., Peloncillo Mtns., Skeleton Canyon, 2.5 km E of Arizona border. RWS 6299.
- Machaeranthera grindelioides* (Nutt.) Shinners. n=8. NM, McKinley Co., 3 km S of Ft. Wingate on NM-400. RWS & W 6193.
- Machaeranthera linearis* Greene. n=4. NM, Luna Co., in Columbus. RWS 6346.
- Machaeranthera pinnatifida* (Hook.) Shinners var. *chihuahuana* Turner & Hartman. n=4. NM, Otero Co., US-70 roadside, 22 km SW of Holloman Air Force Base. W et al. 81-133.
- Melampodium leucanthemum* T & G var. *leucanthemum*. n=10. NM, Mora Co., 16 km W of Canadian River crossing on NM-120. RJS 1640.
- Palafoxia sphacelata* (Torr.) Cory. n=12. NM, Quay Co., US-54 roadside, 8 km NE of Logan. RWS 1934.
- Pectis angustifolia* Torr. var. *angustifolia*. n=12. NM, Doña Ana Co., 9.5 km ENE of southern Las Cruces. W & Price 81-117.
- Psilostrophe tagetina* (Nutt.) Greene. n=16. NM, Otero Co., US-70 roadside, 22 km SW of Holloman AF Base. W et al. 81-134.
- Senecio douglasii* DC. var. *longilobus* (Benth.) Benson. n=20. NM, Dona Aña Co., 5 km E of Las Cruces. W 81-061.
- Senecio fendleri* Gray. n=23. NM, Lincoln Co., on a N ridge of Sierra Blanca peak. RJS & RWS 2018.
- Senecio neomexicanus* A. Gray var. *metcalfei* (Greene) T.M. Barkley. n=46. NM, Grant Co., 18 km N of Mimbres. W 81-046.
- Senecio neomexicanus* A. Gray var. *neomexicanus*. n=23. NM, Otero Co., White Mtns., 18 air km SE of Carrizozo. W & RJS 81-059.
- Senecio neomexicanus* A. Gray var. *toumeyi* (Greene) T. M. Barkley. n=22. NM, Sierra Co., Black Range, Taylor Canyon, 8 air km NE of Gila Cliff Dwellings National Monument. W & T 81-184.
- Senecio vulgaris* L. n=20. NM, Doña Ana Co., Las Cruces. W 81-017.
- Stephanomeria pauciflora* (Torr.) A. Nels. n=8. NM, Doña Ana Co., 13 km E of Las Cruces. W et al. 81-140.
- Thelesperma megapotamicum* (Spreng.) Ktze. n=11. NM, Sierra Co., 30 km NW of Cuchillo along NM-52. W & T 81-168.
- Townsendia grandiflora* Nutt. n=9. NM, Harding Co., 3 km W of Mills. RWS, RJS & W 5996.
- Trixia californica* Kell. n=27. NM, Doña Ana Co., 5.7 km E of Las Cruces. W & RJS 81-160; and 13 km E of LC. W et al. 81-136.

Verbesina encelioides (Cav.) Benth. & Hook. var. exauriculata Robins. & Greenm. n=17. NM, Doña Ana Co., 11 km E of Las Cruces. W 81-123.

Viguiera dentata (Cav.) Spreng. n=17. NM, Luna Co., N end of the Florida Mtns. RWS 6206.

Zinnia acerosa (DC.) A. Gray. n=10. NM, Doña Ana Co., 11 km E of Las Cruces. W & Price 81-111.

BORAGINACEAE Cryptantha barbigera (Gray) Greene. n=6. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5971.

Cryptantha pterocarya (Torr.) Greene. n=12. NM, Hidalgo Co., Granite Gap, roadside of US-80, 20 km S of Road Forks. RWS 6457.

Cryptantha jamesii (Torr.) Pays. var. multicaulis (Torr.) Pays. n=6. NM, Doña Ana Co., 5.7 km E of Las Cruces. RWS & Singer 5954.

Mertensia franciscana Heller. n=12. NM, Lincoln Co., White Mtns., Eagle Creek, 5.6 km WNW of Alto. W et al. 81-125b.

Pectocarya recurvata Johnst. n=12. NM, Hidalgo Co., Granite Gap, along US-80, 20 km S of Road Forks. RWS 6454.

BRASSICACEAE Arabis fendleri (Wats.) Greene. n=7. NM, Grant Co., 19 km N of Mimbres, NM. W 81-048; and Doña Ana Co., Dripping Springs Canyon, 18 km E of Las Cruces. W 81-077.

Descurainia pinnata (Walt.) Britt. var. ochroleuca (Wooton) Shinners. n=14. NM, Doña Ana Co., NMSU campus, Las Cruces. W 81-038; and N base of Mt. Summerford, 5 km NE of Doña Ana. W & Suberkropp 81-035.

Draba helleriana Greene var. blumeri C. L. Hitchc. n=9. NM, Sierra Co., Black Range, Diamond Creek. W & T 81-181.

Draba mogollonica Greene. n=16. NM, Grant Co., Black Range, upper Mimbres River Valley, 17 km N of Mimbres. W 81-047.

Dryopetalon runcinatum A. Gray var. runcinatum. n=12. NM, Doña Ana Co., Organ Mtns., Dripping Springs Canyon, 17 km E of Las Cruces. W 81-075.

Lepidium lasiocarpum Nutt. var. rotundum C. L. Hitchc. n=16. NM, Doña Ana Co., S edge of Las Cruces. W 81-053.

Lesquerella aurea Wooton. n=7. NM, Otero Co., Sacramento Mtns., Cox Canyon, 2.5 km S of Cloudcroft. RJS & W 1651.

Lesquerella fendleri (A. Gray) Wats. n=6. NM, Doña Ana Co., 13 km SE of Las Cruces. W & Price 81-106.

Lesquerella valida Greene. n=5. NM, Lincoln Co., White Mtns., 5 km E of Bonito on NM-37. W & RJS 81-055.

Nerisyrenia camporum (A. Gray) Greene. n=36. Otero Co., US-70 roadside, E edge of Tularosa. W & Suberkropp 81-031. This octoploid increases the large aneuploid assortment of chromosome counts stated in Bacon (1976).

Sisymbrium altissimum L. n=7. NM, Sierra Co., Black Range, Taylor Canyon. W & T 81-191.

Sisymbrium irio L. n=7. NM, Otero Co., US-70 roadside, E edge of Tularosa. W & Suberkropp 81-032a.

Thlaspi montanum L. var. fendleri (A. Gray) P. Holmgren. n=7.
NM, Grant Co., Black Range, 18 km N of Mimbres, NM. W 81-042.

CARYOPHYLLACEAE Arenaria confusa Rydb. n=22. NM, Otero Co.,
Sacramento Mtns, 8 km NE of Cloudcroft. RJS, RWS, & W 2034.
Cerastium arvense L. ssp. strictum (L.) Ugborogho. n=18. NM,
Lincoln Co., White Mtns., Eagle Creek Canyon, 6.4 air km WNW
of Alto. W & Arsuffi 81-085.

Cerastium vulgatum L. var. vulgatum. n= ca. 68. New Mexico,
Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 air km WNW
of Alto, NM. W et al. 81-132b.

EUPHORBIACEAE Croton pottsii (Kl.) Muell. Arg. var. pottsii.
n=20. NM, Doña Ana Co., 8 km E of Las Cruces.
W & Price 81-116b.

Ditaxis neomexicanus (Muell. Arg.) Heller. n=12. NM, Doña Ana
Co., 13 km SE of Las Cruces. W & Price 81-109.

Euphorbia dentata Michx. n=14. NM, Luna Co., roadside of NM-61,
5.6 km S of Faywood. RWS 6216.

Euphorbia glyptosperma Engelm. n=11. NM, Luna Co., NM-61 hwy
ca. 5.6 km S of Faywood. RWS 6218.

Euphorbia hyssopifolia L. n=6. NM, Luna Co., roadside of NM-61,
5.6 km S of Faywood. RWS 6212.

Euphorbia indivisa (Engelm.) Tides. n=9. NM, Luna Co., roadside
of NM-61, 5.6 km S of Faywood. RWS 6213.

Euphorbia revoluta Engelm. n=10. NM, Grant Co., W edge of
Bayard. RWS 6220.

Euphorbia supina Raf. n=7. NM, Luna Co., roadside of NM-61, 5.6
km S of Faywood. RWS 6217.

FABACEAE Astragalus bisulcatus (Hook.) Gray var. bisulcatus.
n=11. NM, Union Co., 8 km E of NM-120, 1.5 km S of US-56.
RWS 7033.

Crotalaria pumila Ortega. n=16. NM, Hidalgo Co.,
Peloncillo Mtns., Skeleton Canyon. RWS 6321.

Dalea purpurea Vente. var. arenicola (Wemple) Barneby. n=7. NM,
Harding Co., 3 km W of Mills. RWS, RJS & W 5992.

Desmodium neomexicanum Gray. n=11. NM, Grant Co., W edge of
Bayard. RWS 6223.

Desmodium rosei Schubert. n=11. NM, Grant Co., W edge of
Bayard. RWS 6222.

Hedysarum boreale Nutt. n=8. NM, Harding Co., 10 km N of
Mills on NM-39. RWS, RJS, Fletcher & Fisher 6032.

Lathyrus graminifolius (Wats.) White. n=7. NM, Catron Co.,
Mogollon Mtns., 10 km S of Glenwood. RJS & W 2133.

Lotus neomexicanus Greene. n=7. NM, Doña Ana Co., S roadside of
US-70, 0.8 km W of Organ. W & RWS 81-019.

Lupinus plattensis Wats. n=24. NM, Union Co., 32 km E of
Clayton, roadside of US-56. RWS 7050.

Medicago lupulina L. n=8. NM, Lincoln Co., White Mtns., on the
banks of Eagle Creek, 5.6 km WNW of Alto. W & Arsuffi 81-094.

Prosopis velutina Wooton. n=14. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5967.
Psoralea tenuiflora Pursh var. tenuiflora. n=10. NM, Guadalupe Co., 24 km N of Santa Rosa. RJS, RWS & W 1615.
Vicia americana Muhl. var. linearis (Nutt.) Wats. n=7. NM, Lincoln Co., Eagle Creek, 5.6 km WNW of Alto. W et al. 81-129.

HYDROPHYLLACEAE Nama hispidum A. Gray var. mentzelii Brand. n=7. NM, Doña Ana Co., NMSU campus, Las Cruces. W 81-039.
Phacelia arizonica A. Gray. n=11. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5968.
Phacelia bombycinia Wooton & Standley. n=11. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5969.

LAMIACEAE Agastache cana (Hook.) Woot. & Standl. n=9. NM, Luna Co., N end of Florida Mtns. RWS 6205.
Hedeoma nanum (Torr.) Briq. var. nanum. n=18. NM, Doña Ana Co., 8 km E of Las Cruces. W & Price 81-116a.

LINACEAE Linum vernale (Wooton) Small. n=15. NM, Doña Ana Co., 5.6 km E of Las Cruces. RWS & Singer 5955.

LOASACEAE Mentzelia albicaulis Dougl. n=18. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon, 1.5 km E of Arizona border. RWS 5972.

MALVACEAE Sphaeralcea angustifolia (Cav.) G. Don var. cuspidata (Britt.) Gray. n=5. NM, Grant Co., roadside of US-180, Mangus Springs. RJS & W 2118

Sphaeralcea coccinea (Nutt.) Rydb. var. coccinea. n=10. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6080.
Sphaeralcea wrightii Gray. n=10. NM, Sierra Co., .4 km N of Elephant Butte Dam. RWS, RJS & Medina 6391.

Sida filicaulis Torr. & Gray. n=6. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6200.

NYCTAGINACEAE Allionia incarnata L. n=20. NM, Doña Ana Co., 9.6 km ENE of NMSU campus, Las Cruces. W 81-115. Only one previous count, n = ca. 58 from Peru, has been reported for this species (Federov, 1969).

OROBANCHACEAE Conopholis alpina Liebm. var. mexicana (A. Gray) Haynes. n=20. NM, Otero Co., White Mtns., Nogal Canyon, 19 air km SE of Carrizozo. W & RJS 81-060.

PAPAVERACEAE Corydalis aurea Willd. n=8. NM, Grant Co., Black Range, upper Mimbres River Valley, 12 mi N of Mimbres. W 81-044.

POACEAE Bromus tectorum L. n=7. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W et al. 81-130.

Glyceria striata (Lam.) Hitchc. n=10. NM, Lincoln Co., White Mtns., 5 air km W of Alto. W & Arsuffi 81-153.

Hordeum jubatum L. n=7. NM, Doña Ana Co., Las Cruces. W 81-037.

Poa trivialis L. n=7. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 7 km WNW of Alto. RJS & W 1609.

POLEMONIACEAE *Gilia mexicana* A. & V. Grant. n=18. NM, Grant Co., NM-61 roadside, 6.4 km N of Faywood. W & Hansen 81-067; and Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5973. The collection RWS 5973 was found growing with *G. flavocincta* A. Nelson ssp. *australis* (A. & V. Grant) Day & Grant (collected as RWS 5974), and had small- to intermediate-sized corollae. One plant had pollen stainability of 91%; another plant had stainability of 93%. The collection from Faywood (W & Hansen 81-067) near the south edge of the Gila Wilderness was not sympatric with congeners. Two classes of pollen grains were found; one type was spherical with 570 micron diameter, and the other was flattened globes measuring 290 microns in diameter and 240 microns thick. Of the larger type, 92% stained normally; of the smaller ones, 22% were stainable.

Ipomopsis longiflora (Torr.) V. Grant. n=7. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-066.

Ipomopsis multiflora (Nutt.) V. Grant. n=7. NM, McKinley Co., 3 km S of Ft. Wingate, roadside of NM-400. W & RWS 81-495.

Ipomopsis pumila (Nutt.) V. Grant. n=7. NM, Doña Ana Co., 5 km E of Las Cruces. W 81-063.

Microsteris gracilis (Dougl. ex Hook.) Greene var. *humilior* (Hook.) Cronq. n=7. NM, Upper Mimbres River Valley, Grant Co., 18 km N of Mimbres. W 81-049.

POLYGONACEAE *Eriogonum abertianum* Torr. in Emory var. *abertianum*. n=20. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6199

Eriogonum abertianum Torr. in Emory var. *cyclosepalum* (Greene) Fosberg. n=20. NM, Doña Ana Co., US-70 roadside, 1 km W of Organ. RWS & RJS 6198.

Eriogonum havardii S. Wats. n=20. NM, Guadalupe Co., 1 km N of Vaughn. RWS, RJS & W 6074.

Rumex acetosella L. n=21. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W et al. 81-127.

Rumex hymenosepalus Torr. n=20. NM, Doña Ana Co., roadside of US-70, 0.8 km W of Organ. W & RWS 81-018.

PRIMULACEAE *Androsace occidentalis* Pursh var. *occidentalis*. n=10. NM, Grant Co., 18 km N of Mimbres. W 81-041.

Androsace septentrionalis L. var. *subulifera* A. Gray. n=10. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 6.4 km WNW of Alto. W et al. 81-026.

RANUNCULACEAE Ranunculus inamoenus Greene var. inamoenus. n=24. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5.6 km WNW of Alto. W & Arsuffi 81-093.

ROSACEAE Rosa neomexicana Cockl. n=7. NM, Lincoln Co., White Mtns., Villa Madonna, 5 km NW of Alto. RWS 5981.

SCROPHULARIACEAE Besseya plantaginea (James) Rydb. n=24. NM, Sierra Co., Black Range, Taylor Canyon. W & T 81-187b.

Castilleja integra A. Gray. n=24. NM, Doña Ana Co., Organ Mtns., 18 km SE of Las Cruces. RWS & Singer 5957.

Castilleja lanata A. Gray. n=12. NM, Catron Co., Mogollon Mtns., 10 km S of Glenwood. RJS & W 2126.

Castilleja wootoni Standley. n=12. NM, Lincoln Co., White Mtns., Eagle Creek Canyon, 5 km NW of Alto. RJS, RWS & W 2024.

Linaria texana Scheele. n=6. NM, Doña Ana Co., Organ Mtns., 14 km E of Las Cruces. W 81-083.

Orthocarpus luteus Nutt. n=14. CO, Saguache Co., SW corner of county, 21 km W of Colorado-114 on Road 8EE. RWS & RJS 5821.

Penstemon albidus Nutt. n=8. NM, Union Co., 32 km E of Clayton on US-56. RWS 7048.

Penstemon superbus A. Nelson. n=8. NM, Hidalgo Co., Peloncillo Mtns., Guadalupe Canyon. RWS 5965.

Schistophragma intermedia (Gray) Pennell. n=20. NM, Hidalgo Co., Peloncillo Mtns., Skeleton Canyon, 2.5 km E of Arizona border. RWS 6297.

Veronica arvensis L. n=8. NM, Lincoln Co., Eagle Creek Canyon, 3.5 mi WNW of Alto. W et al. 81-132a.

Veronica americana Schwein. ex Benth. n=18. NM, Lincoln Co., White Mtns., 3 air mi W of Alto. W & Arsuffi 81-154.

Thanks are extended to Dr. T. M. Barkley for confirming the identities of the Senecio spp. and to Dr. Reed Rollins for confirming my identification of Lesquerella valida and many of the other crucifers.

LITERATURE CITED

Bacon, J. D. 1978. Taxonomy of Nerisyrenia (Cruciferae). Rhodora 80:159-226.

Fedorov, A. A. [ed.] 1969. Chromosome numbers of flowering plants. Acad. Sci. U.S.S.R., Komarov Botanical Institute, Leningrad.

Snow, R. 1963. Alcoholic hydrochloric acid-carmine as a stain for chromosomes in squash preparations. Stain Technol. 38:9-13.

GREASEWOOD (SARCOBATUS VERMICULATUS (HOOK.) TORR.)

Joseph H. Robertson - University of Nevada-Reno, Nevada

TAXONOMY

Nomenclature. Big greasewood, black greasewood, or here simply greasewood, is a spiny deciduous shrub with simple, fleshy leaves. It is a member of the worldwide goosefoot family (Chenopodiaceae) with 14 genera in the U.S.A. Seepweeds (Suaeda spp.) glass worts (Salicornia spp.) and pickleweed (Allenrolfea occidentalis), all halophytes, are its close relatives. The family formula is $K^5 C^0 A^5 G^2$ or $Ca^2 Co^0 S^2-5 P^1$ (45,65).

The genus name is derived from the Greek "sark" meaning flesh and "batis" meaning bramble. The adjective is from the Latin "vermis" meaning worm and "ulus" meaning small.

The species is both monoecious and dioecious. The worm-like staminate aments are 0.5-3.0 cm. (0.2-1.2 in) long. The pistillate flowers are either solitary or in small clusters. The colorful, winged fruits are 0.8-1.3 cm. (0.3-0.5 in.) long and broad. It is known to hybridize with other goosefoot genera (21).

Greasewood attains heights of $\frac{1}{2}$ -3 m. ($1\frac{1}{2}$ -10 ft.). The wood is hard and strong. The bark varies from yellow to black. It is not to be confused with other "greasewoods", creosotebush (Larrea tridentata) or chamiso (Adenostema fasciculatum), nor with greasebush, (Forsellesia spinescens) (20, 35, 46, 67).

DISTRIBUTION

Greasewood thrives in many associations from Mexico to Canada but prefers the cold deserts north of 37° latitude. It is estimated to cover over 4.8 million ha. (12 million acres), more than any other phreatophyte (64).

Alkali sinks of the Great Basin are encircled by zones of greasewood. It is a minor component of sandhill vegetation of the Mississippi Valley. Neither alkali, salt, nor high watertable are absolute requirements (22). It is found among other succulents of the strand above tide water mark in southern California (3).

When native shrub communities of the sagebrush-wheatgrass (Artemisia sp.-Agropyron sp.) zone are ranked in importance (sic) in southeastern Washington and adjacent Idaho, greasewood stands